

**Malaria-related Knowledge, Attitudes and Practices (KAP)  
in Rural Cambodia**

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April, 2006

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## **EXECUTIVE SUMMARY**

**Introduction:** Malaria is an ongoing problem in Cambodia. Kep municipality is located in southern Cambodia along the Gulf of Thailand. The village of Chom Kabey is thought to have the highest incidence of malaria in Kep municipality. Education programs are currently in existence in Chom Kabey, and malaria incidence is believed to be declining.

**Methods:** A cross-sectional knowledge, attitudes, practices (KAP) survey was conducted in Chom Kabey village, between January and March 2006. The survey collected respondent level and household level data. Means, frequencies and logistic regression were used in the analysis

**Results:** A total of 291 households were surveyed representing 636 adults and 852 children. In all, 21.2% of adults and 7.6% of children had experienced an episode of malaria in Chom Kabey village. Overall, respondents had good knowledge of the mode of transmission and symptoms of malaria. Most respondents answered that malaria was a serious disease for adults and children, and were worried about getting the disease. It was found that 96.6% of households used a bed net for protection against malaria and there was an average of 3.3 people per bed net. Approximately half of respondents had been educated about malaria by radio broadcasts or village health volunteers. There were few statistically significant associations between having malaria and KAP questionnaire items.

**Discussion:** To the best of our knowledge, the findings from this study are the first of its kind in Cambodia. The study highlights the importance of collecting data at the village level. This study will help inform malaria education and prevention campaigns in Kep.

## **INTRODUCTION**

### **Cambodia**

Cambodia is a small country in South East Asia with a total area of 180,000 km<sup>2</sup> and a population of 11.8 million.<sup>1</sup> It is located on the Gulf of Thailand and is bordered by Thailand, Laos and Vietnam. The climate of Cambodia is tropical with little seasonal temperature variation.<sup>1</sup> There is a monsoon season from May to November and a dry season from December to April. The landscape is primarily flat, with mountains to the north and southwest. Approximately 62% of the country is covered in forest or jungle.<sup>1</sup>

Cambodia has experienced political and economic struggles over the past 30 years. The country was ruled by the Khmer Rouge from 1975 – 1979 resulting in the death of an estimated 1.5 Cambodians.<sup>1</sup> Fighting continued between the Vietnamese and internal political groups until 1992, although peace was not achieved until 1998. From 1975 – 1998, millions of Cambodians were either internally displaced or left the country to live in Thai refugee camps along the Cambodia-Thai border.

### **Malaria in Cambodia**

Malaria remains a serious health risk in Cambodia, and is associated with forest/jungle, forest-fringe areas, and rubber plantations.<sup>1</sup> Nationally, the incidence of malaria has declined in recent years, from 10.3 cases per 1000 in 2003, to 7.5 cases per 1000 in 2004.<sup>2</sup> The epidemiology of malaria in Cambodia varies in different regions of the country. According to the World Health Organization (WHO), the prevalence of malaria is between 15% and 40% in villages with close proximity to forests, and 0%-3% in rice field areas and plains.<sup>3</sup> The highest transmission of malaria in Cambodia occurs along the forested borders with Thailand, Laos and Vietnam. There is little or no transmission in the capital of Phnom Penh and the majority of malaria

cases in the south are imported from the north. Risk factors for malaria in Cambodia are new settlers in an area of high transmission, living or working in close proximity to forests, not using a bed net in an area of high transmission, and being a child or a pregnant woman.<sup>4</sup>

### **Parasitology of Malaria**

Malaria is a parasitic infection transmitted by the bite of the *Anopheles* mosquito.<sup>1</sup> The parasites responsible for malaria are the Plasmodia species and only four plasmodia are infectious to humans; *P.falciparum*, *P.vivax*, *P.ovale*, and *P.malariae*.<sup>5</sup> Globally, the majority of cases of malaria, and all deaths are caused by *P.falciparum*.<sup>5</sup> Similarly, in Cambodia, *P.falciparum* and *P.vivax* are the dominant causes of malaria, with 82% of laboratory-confirmed cases of malaria due to *P.falciparum*.<sup>2</sup>

Several *Anopheles* spp. have been detected in Cambodia, differing in breeding locations, and biting habits. The main vectors in Cambodia are *An. dirus* and *An. minimus*. *An.minimus* breeds along the edges of streams, wells, flowing waters such as foothill streams, springs, and irrigation ditches, as well as rice fields. *An. dirus* breeds in small water collections located in forest fringe or thick forest. Both these vectors are primarily anthropophilic (bite humans) and *An. dirus* is exophagic (bites outdoors), while *An. minimus* is endophagic (bites indoors).<sup>1</sup>

### **Municipality of Kep, Cambodia**

The municipality of Kep is located 172 km south of Phnom Penh, along the Gulf of Thailand. Kep is comprised of 2 districts, 5 communes and 16 villages, and had a population of 37,470 in 2005.<sup>6</sup> Kep is a rural municipality and the landscape is largely flat with scattered foothill regions. The primary socio-economic activities are fishing, rice farming and plantations. Government-provided healthcare in the municipality is accessed at four health centres (Pong Tek, Okrasa, Angkol, Prey Thom) and one referral hospital. Each of these health centres serves two to five villages. Residents of Kep also seek health services from private practitioners, traditional healers and pharmacies.

### **Epidemiology of Malaria in Kep**

Compared to other provinces in Cambodia, the burden of malaria in Kep is low, and the number of cases of malaria diagnosed by health centres declined from 297 in 2004, to 128 in 2005 (Personal communication, Dr Na Vaan, MOH). In 2005, the incidence of malaria in Kep was 3.4/1000 (Personal communication, Dr Na Vaan, MOH). This rate of malaria represents all 16 villages in the municipality. However, health officials believe that variation exists in rates of malaria between villages. It is believed that villages closer to the forest (Chom Kabey, Ronés and Krevcrasang) have higher malaria rates, and that these higher rates are masked by villages with little or no malaria. In Kep, health data is only provided at the level of the health centre and village level data is not available. Additionally, incidence rates provided by health centres are certainly an underestimate of the true incidence because they do not include cases diagnosed and treated by private health practitioners, who figure prominently in Cambodia's health care system.

### **Malaria Education and Treatment in Kep**

There are two types of clinical diagnoses of malaria; uncomplicated and severe/complicated malaria. In most instances, patients diagnosed with uncomplicated malaria return home with their malaria medication, while treatment of severe/complicated malaria requires hospitalization. According to the 2002 National Treatment Guidelines, treatment of uncomplicated malaria consists of a three-day regimen of tablets, and the type of medication differs according to the species of Plasmodium. First line treatment for adult *P.falciparum*, the most common type of malaria in Cambodia, is artesunate and mefloquine tablets (termed A+M or Malarine). Intravenous fluid or injections of 5-10% dextrose may also be given in cases where patients are dehydrated.

### **Malaria Education, Bed net Distribution and Impregnation in Kep**

In Kep, insecticide treated bed nets (ITN) distribution and malaria education activities in the community are led by Red Cross Volunteers, termed Village Health Volunteers (VHV). The VHVs are trained by the supervisory malaria physician for the municipality of Kep, and equipped with educational materials



including posters, flip charts and booklets to educate their villages about malaria. Free ITN have only been distributed in Kep since 2004. Local health officials aim to re-treat bed nets with insecticide twice a year, and at minimum every ten months. This falls within the WHO guidelines which state that on average, nets must be re-treated with insecticide after three washings or at least every year.<sup>7</sup>

### **Chom Kabey Village**

Health officials believe that Chom Kabey village has the highest incidence of malaria in Kep. The population of Chom Kabey village is estimated to be 3098 and is comprised of 589 families.<sup>6</sup> The primary sources of income are from plantations and rice farming. Chom Kabey is among the most remote villages in Kep and is located on the border between Kep and the neighbouring province of Kampot. The natural landscape of the village is a combination of flat regions for farming and foothills. Chom Kabey village falls in the catchment area for Pong Tek health centre, in addition to four other villages.

### **Objective**

The aim of the study was twofold 1) to describe malaria related knowledge, attitudes, and practices of individuals and households in Chom Kabey village, Kep municipality, and 2) to understand the malaria burden in the village.

## **METHODS**

### **Study Design**

The study was designed as a cross-sectional household survey, and was conducted from January to March 2006. The study was conducted in Chom Kabey village (Bonk Tek commune, Damdakchangoeur district). Chom Kabey was selected based on the needs identified by the supervisory malaria physician for the municipality of Kep who reported to investigators that Chom Kabey village had the greatest burden of malaria. The research team consisted of two investigators (SF, KS) and two interpreters (RS, CT). Both interpreters spoke Khmer as a first language and were fluent in English. They had previous experience translating in a research environment and were familiar with the study area.

Prior to questionnaire design, the research team held three meetings with the supervisory malaria physician for the municipality of Kep to establish what malaria education and prevention programs had been enacted in Chom Kabey village, and what treatment guidelines were being followed. These meetings were essential in the design of the survey and to understanding the burden of malaria in the region. Sessions with the investigators and translators were held to review how the survey would be translated and to reduce interviewer bias.

Since there is no system of addresses or postal codes in Chom Kabey village, households were sampled by dividing the village into 7 smaller areas based on the layout of the roads running through the village. Households along the village roads and in the jungle were surveyed. Every attempt was made to obtain a representative sample. Based on the length of time allocated for the research project, and the expected number of interviews conducted per day, the target sample size was 294 households, approximately 50% of the number of families in the village.

Interviews were held at the households and oral consent was obtained prior to commencement of the interview. The only inclusion criterion for the study was living in Chom Kabey for at least 2 months. A male or female head of household was required to provide responses to the survey. It was assumed that the length of residence in Chom Kabey for all members of the household was identical to the length of residence of the interviewee. Toothbrushes, pens or pencils were provided as compensation following each interview.

### **Questionnaire**

A Knowledge, Attitudes, Practices (KAP) questionnaire was designed consisting of 55 questions, of which 8 were structured and 7 were open-ended. The questionnaire included 8 demographic items, 5 knowledge

items, 6 attitude questions, 16 preventive practices questions, 15 questions on health seeking behaviour and 6 questions designed to understand malaria education previously received by the villagers (Table 1).

The survey collected individual level data as well as household-level data. The knowledge, attitudes and education sections solely provided individual level data. The preventive practices and health seeking behaviour sections provided individual and household level data. The survey was piloted in 10 households in the village, after which modifications were made where appropriate.

Table 1: Summary of KAP survey on malaria

Questionnaire Section	Information collected		
Demographic	•Age •Sex •Length of residence in village	•Education •Occupation •Marital status	•Household size •Number of children
Knowledge	•What is malaria •Signs and symptoms	•Mode of transmission	•Risk of malaria
Attitudes	•Severity of disease	•Concern about malaria	•Where malaria is a problem
Preventive practices	•Protection against malaria •Bed nets owned/used	•Patterns of bed net use	•Bed net maintenance
Treatment seeking practices	•Previous household experience with malaria	•Treatment received	
Education	•Radio education	•VHV education	

### Statistical Analysis

A profile describing the population of Chom Kabey village was compiled using frequencies of the socio-demographic variables for the entire sample, and by sex. Knowledge, attitudes, preventive and treatment practices, as well as the burden of malaria were analyzed using frequencies and means. Risk of malaria was analyzed at the individual level and household level. Cross-tabular analyses were done to determine if there were differences in malaria according to socio-demographic and KAP items. This was done for lifetime episodes of malaria and Chom Kabey episodes of malaria. Logistic regression was used to explore the relationships between episodes of lifetime malaria and the demographic and KAP items. All regression analyses were stratified by sex. EpiInfo version 3.3.2 was used for survey design, data input and analysis. Statistical significance was defined at the level of  $p < 0.05$ .

## RESULTS

### i. Study population

A total of 294 households were surveyed. Three surveys were eliminated from the study because either a head of household was not interviewed or the respondent had not resided in Chom Kabey for a minimum of two months, leaving a final sample size of 291 (49.4% of village households). Interview times ranged from 5 to 15 minutes.

The household surveys represented a total of 1488 people (636 adults and 852 children) and 291 families. Of the 291 respondents, 60.8% of the respondents were female. Table 2 shows the socio-demographic profile of the entire study population, and stratified by sex.

Table 2: Distribution of the demographic variables for all respondents, and by sex

	All respondents		Men		Women	
Variable	n	%	n	%	n	%
<b>Sex</b>						
Male	114	39.3	114	100.0	-	-
Female	177	60.8	-	-	177	100.0
<b>Age group</b>						
18-24	30	10.3	8	7.0	22	12.4
25-34	76	26.1	34	29.8	42	23.7
35-44	76	26.1	23	20.2	53	29.9
45-54	58	19.9	17	14.9	41	23.2
55-64	30	10.3	21	18.4	9	5.1
65+	21	7.2	11	9.6	10	5.6
<b>Length of residence</b>						
< 5 years	73	25.1	32	28.1	41	23.2
5-10 years	160	55.0	62	54.4	98	55.4
>10 years	58	19.9	20	17.5	38	21.5
<b>Marital status</b>						
Single	5	1.7	3	2.6	2	1.1
Married	254	87.3	109	95.6	145	81.9
Widowed	32	11.0	2	1.8	30	16.9
<b>Education</b>						
No School	87	29.9	15	13.2	72	40.7
Primary school	131	45.0	55	48.2	76	42.9
Secondary school	70	24.1	41	36.0	29	16.4
> Secondary school	3	1.0	3	2.6	0	0.0
<b>Occupation</b>						
Farmer/plantation	235	80.8	97	85.1	138	78.0
Thatchmaker	20	6.9	0	0.0	20	11.3
Fisherman	1	0.3	0	0.0	1	0.6
Merchant	4	1.4	3	2.6	1	0.6
Other	31	10.7	14	12.3	17	9.6

The biggest difference between sexes was with respect to education. It was found that 40.7% of women had no schooling at all in comparison to 13.2% of men ( $p < 0.05$ ). Table 3 describes the mean age, length of residence, household size and number of children per household for the sample. There were no differences in mean age and length of residence in Chom Kabey between men and women.

Table 3: Mean age, length of residence, household size and number of children

Variable	Mean	Standard Deviation	Range
Age	40.5 years	13.8	19 – 86
Length of residence in CK	7.7 years	5.2	1 – 55
Household size	5.1 people	2.3	1 – 14
Children/household	2.9 children	2.1	0 – 12

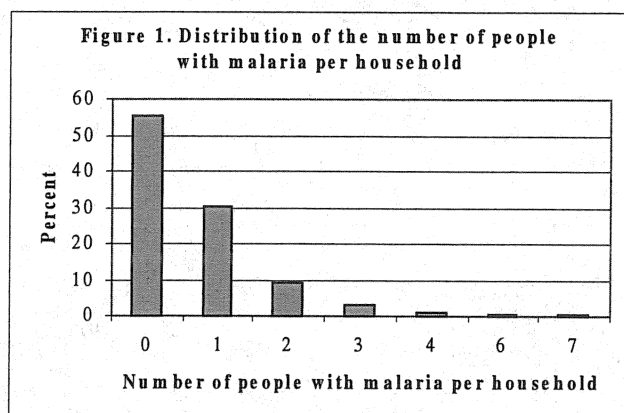
## ii. Malaria in Chom Kabey

### Malaria Burden in Chom Kabey

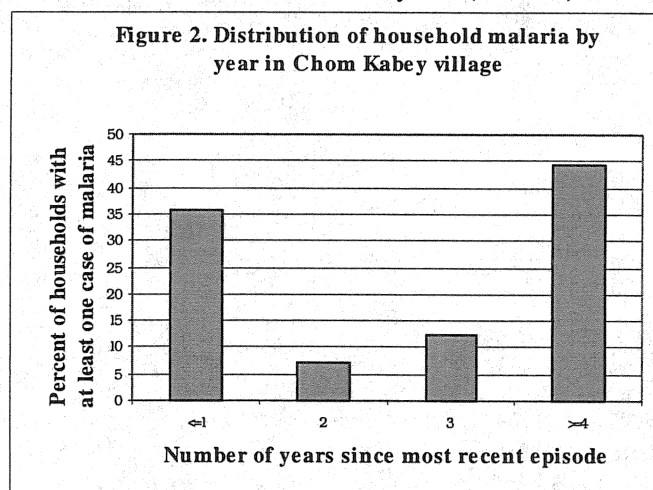
Of all households surveyed, 200 people (with a cumulative 392 malaria episodes) had experienced malaria in Chom Kabey, representing 13.4% of the population surveyed. This figure was 21.2% (n=135) for adults and 7.6% (n=65) for children.

### Malaria Burden of Households

At the household level, 44.7% (n=130) had at least one member of the household experience malaria. The distribution of the number of people with malaria per household is shown below (Figure 1).



Of these 130 households, 35.9% had experienced malaria in the past year (Refer to Figure 2 for the distribution of household malaria by most recent episode). The mean length of time since an episode of malaria in the household was 3.8 years (SD=3.4) with a range of 1 month to 19 years.

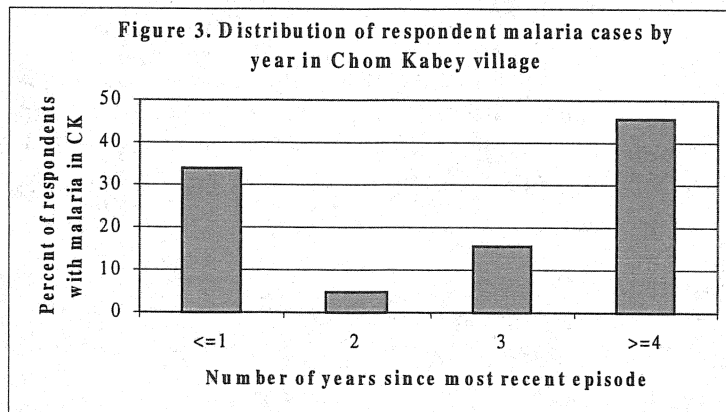


### Malaria Burden of Respondents

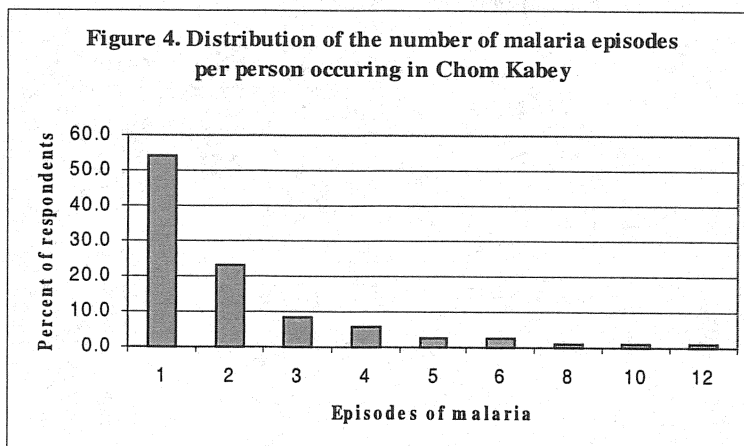
**Lifetime Experience.** In the sample, 40.2% (n=117) of respondents had experienced at least one episode of malaria in their lifetime, 53.3% of which were male and 30.5% were female. Table A1 (Appendix) depicts the burden of malaria stratified according to demographic variables. The length of time since the most recent case of malaria among respondents ranged from 1 month to 34 years, with a mean of 7.4 years (SD= 8.0).

**Chom Kabey Experience.** In all, 28.5% of respondents (n=83) had experienced at least one episode of malaria while living in Chom Kabey village, 35.1% for men and 24.3% for women. Of all the malaria cases in

Chom Kabey, 33.7% (n=28) occurred in the past year. Refer to Figure 3 for the distribution of malaria cases by year among respondents.



The most recent case of malaria among the respondents ranged from 1 month to 19 years ago with a mean of 4.1 years (SD=3.7). A total of 176 episodes of malaria were experienced by respondents. There was an average of 2.1 (SD=2.0) episodes per respondent. Over half of the respondents with malaria had only experienced malaria once. The distribution of the number of malaria episodes per person is shown in Figure 4.



### iii. Malaria Knowledge

Overall, the villagers demonstrated good knowledge of malaria. Of all the respondents, 99.0 % (97.0 – 99.8) had heard the term malaria before, and 82.8% (77.9 – 86.9) were able to identify malaria as a disease. Stratified by sex, men and women were similarly able to identify malaria as a disease; 86.8% of men, and 80.1% of women (p>0.05).

*Knowledge of Symptoms:* 79.7% of respondents were able to correctly identify fever and chills as symptoms of malaria. Table 4 lists the most commonly reported symptoms of malaria.

Table 4: Symptoms of Malaria Reported by Respondents

Symptom	n	% of respondents reporting the symptom
Fever and Chills	232	79.7
Fever	252	86.6
Chills	235	80.8

Headache	62	21.3
Rash	14	4.8
Other*	50	17.2

\* Other includes vomiting, sweating, fatigue, loss of appetite, abdominal pain and dizziness

*Knowledge of Mode of Transmission.* Mosquitoes were correctly identified as the mode of transmission of malaria by 85.9 % of respondents, and water was the second most commonly reported mode of transmission (28.2%) (Table 5). Despite the high level of awareness of mosquitoes as the vector for malaria, 23.0% of interviewees believed that malaria is transmitted by both mosquitoes and water, and 8.6% of respondents did not know how the disease is transmitted.

Table 5: Mode of Transmission of Malaria Reported by Respondents

Mode of Transmission	n	% of respondents reporting the mode of transmission
Mosquito	250	85.9
Water	82	28.2
Mosquito AND Water	67	23.0
Food	7	2.4
Other	3	1.0
Don't know	25	8.6

*Knowledge of time of day of greatest risk of malaria:* As seen in Table 6, only 28.5 % (n= 83) of respondents correctly identified that the greatest risk for malaria occurs between night (dusk) and morning.

Table 6. Time of Day of Greatest Malaria Risk Reported by Respondents

Time of day of greatest risk of malaria	n	% reporting respondents
Any time of day	98	33.8
Night to morning	83	28.6
Morning to night	68	23.4
Other	10	3.2
Don't know	31	10.7

#### iv. Attitudes regarding malaria

In total, 93.8% of villagers surveyed stated they worried about getting malaria. When asked about the severity of the disease, 87.6% believed malaria is a serious disease for adults, and 82.5% believed malaria is a serious disease for children. Respondents were also asked whether they thought malaria was a big problem in their village, and in Cambodia. With respect to Chom Kabey village, 59.1% thought malaria was a problem in their village, and 37.8% thought it was not a big problem. Many villagers responded that malaria had been a problem in the village in the past, but was no longer a large problem, or that it was associated with going into the forest. When asked about malaria in Cambodia, 35.4% believed the disease is a big problem, 46.4% said otherwise, while 18.2% did not know. Respondents frequently commented on these questions, by including that malaria was a problem in some parts of the country and that HIV was a larger concern in Cambodia at present.

#### v. Preventive Practices

The use of bed nets was the most frequently reported method of malaria prevention in households (94.5%), followed by boiling water (also referred to as "clean water") (61.9%). Table 7 lists the most common prevention strategies practiced by households in Chom Kabey.



Table 7. Household Malaria Prevention Strategies Practiced in Chom Kabey

Malaria Prevention Method	% respondents	n
Bed net	94.5	275
Clean / Boil water	61.9	180
Bed net AND Clean/Boil water	60.5	176
Clean food	3.1	9
High living standards	13.4	39
Eliminate still water	6.2	18
Clear away brush from around home	1.7	5
Other*	13.4	39

\*Other includes using smoke to keep mosquitoes away by burning leaves or garbage, protecting the household water jar or well, clearing away brush close to the home, and killing mosquito eggs by treating water with chemicals.

### Household bed net use

The majority of households surveyed (96.6%) owned a bed net. Of the 11 households surveyed who did not own a bed net, 9 cited the prohibitive cost as the reason they did not have one. In many households, there was a difference in the number of bed nets owned versus the number of bed nets being used. Households surveyed owned a total of 549 bed nets, 482 of which were being used. Within the household, the number of people per bed net used ranged from 1 -11, with a mean of 3.3 (SD±1.6).

96.8% of households reported that bed nets were shared by at least two people. Of the 280 households that owned a bed net, 68.6% (n=192) reported that everyone in the household always slept under the net. The remaining households were asked to state who in the household always used a bed net, and who in the household either sometimes or never slept under a bed net. The male head of household was the least likely to always use a bed net. The primary reason given why not everyone in the household slept under a bed net was that they did not have enough bed nets (43.6%), and that members found it too hot to use a bed net (37.2%).

*Age of Bed nets:* Data was obtained on the most recent and oldest bed nets currently in use in each household. (Table 8). The mean age of the newest bed net was 11.1 months, however 63.1% of households surveyed were using a bed net they had obtained within the last 3 months. The mean age of the oldest bed net in use was 31.6 months.

Table 8: Mean Age of Most Recent and Oldest Bed Nets in Use

	Mean age (months)	Median	SD	Range
Newest bed net in use	11.1	3.0	18.8	1 – 120
Oldest bed net in use	31.6	24.0	25.6	1 – 120

*Treatment/maintenance of bed nets.* 60% households surveyed (n=168) stated that they were using a bed net obtained over ten months ago. Of these 168 households, 78% (n=131) reported that they had not taken their bed net to be re-treated (Table 9). Further, 65.9% of respondents stated that at least one of the bed nets they used had holes and 31.9% answered that they had not repaired the holes.

Table 9. Rate of Re-Impregnating bed nets among households with a bed net > 10 months old

Re-Impregnated Bed net?	N	%
Yes	37	22.0
No	131	78.0
<b>Total:</b>	168	

*Source of bed nets.* Households with more than one bed net often obtained their bed nets from different sources. 52.1% of households reported obtaining a bed net free from a Red Cross volunteer, 44.6% said they had purchased a bed net, and 4.3% had received a free bed net from a Cambodian political party representative. While most interviewees were able to recall where the bed net had come from, 13.2% reported receiving a free bed net, but could not remember the source and 15.7% had received a free net from either another source, such as a family member, or the source was not reported.

#### vi. Malaria Treatment Practices in Chom Kabey

All respondents who had suffered from malaria in Chom Kabey village (n=83) received treatment. The majority of respondents (51.8%) received treatment from a private practitioner in the village, followed by treatment at a health centre or hospital (Table 10).

Table 10. Health Seeking Behaviour of Respondents with Malaria in Chom Kabey

Location of Treatment	N	%	95% CI
Private Practitioner	43	51.8	40.6 – 62.9
Health centre/hospital	33	39.8	29.2 – 51.1
Traditional healer	6	7.2	2.7 – 15.1
Pharmacy	1	1.2	0.0 – 6.5
Other (Khmer Rouge doctor in the jungle, local NGO)	4 (3, 1)	4.8	1.3 – 11.9

The most common type of treatment received for malaria was pills and an injection (75.9%). Other types of treatment included pills alone, and the use traditional medicines either alone or in combination with pills and an injection (Table 11). From this survey, it was not possible to discern the types of medication that respondents were prescribed. Almost all (97.6%) respondents finished the treatment that they were prescribed.

Table 11. Malaria Treatment Received by Respondents with Malaria in Chom Kabey

Type of treatment	N	%	95% CI
Pills	12	14.5	7.7 – 23.9
Pills and injection	63	75.9	65.3 – 84.6
Pills, injection and traditional medicines	6	7.2	2.7 – 15.1
Traditional medicines	2	2.4	0.3 – 8.4

#### vii. Malaria Education

*Radio Messages.* 54.1% of interviewees had heard malaria broadcasts on the radio. 58.6% reported hearing the announcements daily, 27.4% had heard the broadcast in the past month, and 14% had last heard a message over a month ago (Table 12).

Table 12. Reported Malaria Education Received by Radio Broadcasts

Malaria Education Messages	N	% respondents
Use of bed nets	59	37.6
Keep house clean	37	23.6
Boil / clean water	34	21.7
Use of A+M medication	26	16.6
Eliminate still water	22	14.0
Go to health centre	19	12.1



Don't remember or don't pay attention	39	24.8
Other	23	14.6

*Village Health Volunteers.* Among the respondents, 41.7% had been previously educated by a VHV. Of those who had not received education, 48.4% said they had been too busy to attend a session or meet with the VHV\*. Just over 70% of the respondents had learned to use a bed net to protect them from malaria. The types of education received by the villagers are summarized below (Table 13).

Table 13. Reported Malaria Education Received by VHVs

Type of Education	N	%	95% CI
Use of bed nets	85	70.2	61.3 – 78.2
Keep house clean	38	31.4	23.3 – 40.5
Boil / clean water	39	32.2	24.0 – 41.3
Go to health centre if sick	1	0.8	0.0 – 4.5
Eliminate still water	6	5.0	1.8 – 10.5
Don't remember	13	10.7	5.8 – 17.7
Other**	60	49.9	40.4 – 58.8

\* Sample size for this frequency reduced because not all respondents were asked whether they had been too busy to attend a session or meet with the VHV.

\*\* Other includes: dipping old nets in insecticide, drying dipped nets in the sun, mosquitoes transmit malaria, the importance of good hygiene and eating clean food.

### Associations between Malaria and Knowledge, Attitudes, Practices

Of the demographic items, sex and years lived in Chom Kabey village were significantly associated with respondent lifetime malaria. Age was not significant in any of the models. Men were 2.8 times more likely to have malaria than women ( $p < 0.0001$ ). Length of residence in Chom Kabey reached statistical significance ( $p = 0.04$ ), although the odds ratio was small (1.05). Stratification by sex revealed that no demographic items were significant or approached significance in predicting malaria among men, whereas as in women, length of residence in Chom Kabey was associated with a 10% increase in risk ( $p = 0.008$ ).

Analysis of the knowledge items revealed that the odds of malaria was associated with knowing that malaria is a disease ( $OR = 2.76$ ,  $p = 0.004$ ), and being able to identify both chills and fever as symptoms of malaria ( $OR = 4.84$ ,  $p < 0.0001$ ). Adjusting for sex did not alter the results. None of the attitude items reached statistical significance, even after adjustment. Dipping a bed net in insecticide was associated with almost a 50% reduction in risk of malaria, although this estimate did not reach statistical significance ( $p = 0.07$ ).

No associations were found between household malaria and household-level variables.

### DISCUSSION

Overall, the results from this study indicate that malaria is an ongoing health concern in Chom Kabey village. It was found that men were more likely than women to suffer from malaria. Knowledge among villagers of malaria was high and better than expected, although there were some misconceptions about the transmission of disease. Most respondents were aware of the severity of malaria and worried that they might get the disease. This study also showed that the villagers practice effective malaria preventive and treatment-seeking behaviour.

This study is novel in that it was the first of its kind to collect village-level data on malaria in Kep. At the current time, all data used by health officials for health planning purposes come solely from health centres and hospitals. There are three primary limitations to this data source. First, health centres serve more than one village therefore heterogeneity in health status between villages may be masked. Secondly, health centre data does not include the cases of malaria diagnosed and treated by private practitioners in the village. Our study indicated that 52% of malaria cases were treated by private practitioners. This figure highlights

the importance of collecting data at the village level because otherwise these cases are not included in health data. Third, residents of Chom Kabey village are not restricted to accessing health services at Pong Tek health centre. Distance is an important factor in determining where villagers seek treatment. The closest place to access treatment is a private practitioner in Chom Kabey village, followed by Kampong Trach health centre in the neighbouring province of Kampot, and then Pong Tek health centre in Kep. Therefore, obtaining valid estimates of malaria must include data from all these sources.

This study revealed patterns in malaria incidence that may differ from information provided by health centre data. It is not known if the decline in malaria shown by health centre data has occurred across all villages or if it represents a reduction in malaria in specific villages. Our study revealed that of respondents with malaria in Chom Kabey, 33% had experienced malaria in the past year, which is not in accordance with health centre data. However, this figure may be influenced by reporting patterns of malaria in respondents. Villagers may have been more likely to remember recent episodes of malaria, or may not have been able to recall the exact time of malaria. The survey question was worded "When was your most recent episode of malaria?". Responses "In the past year" could reflect malaria in 2004, 2005, or 2006.

The study revealed some interesting bed net and treatment practices. There was a discrepancy between the number of bed nets owned and the number of bed nets used. As expected, some households had replaced their old net with a new one, but still maintained possession of the older net. However, a small number of households had obtained a new, impregnated bed net, but it remained unused. These households preferred to continue using an old bed net, which was often in need of repair or re-treatment. As an explanation, respondents stated that they were concerned their children would ruin the new bed net, or that their older bed net was still in good condition. There was also a low level of re-treating bed nets with insecticide. Further, this is likely an underestimate of the true percentage of bed nets in use with active insecticide, as respondents were only asked whether or not they had ever taken their net to be re-treated. For instance, a household using a bed net for three years may have only re-treated their bed net once in the three-year period. It is unknown whether the low level of re-treatment reflects a household's lack of awareness and inability to bring their net to be treated, or the absence of sufficient mosquito net treatment activities in Chom Kabey.

Another interesting finding was that many respondents believed malaria to be transmitted by water. It may be that respondents associated mosquito breeding patterns with malaria etiology and answered accordingly. The fact that 82% of respondents included water as a mode of transmission implies that villagers are aware of water-borne diseases and the importance of clean/boiled water. This result reflects favourably on health education programs that counsel villagers to drink clean water to prevent disease. Villagers were weakest in knowing which time of day has the greatest risk of getting malaria. Not knowing that the *Anopheles* mosquito bites from dusk to dawn puts villagers at risk of malaria if they are unaware of the need to protect themselves prior to going to sleep under a bed net.

The majority of respondents with malaria in Chom Kabey reported they were treated with tablets and an injection. Intravenous fluid or injections of 5-10% dextrose may be given in cases where patients are dehydrated, however respondents did not recognize these injections as being distinct from the anti-malarial action of the tablets. This highlights a low level of knowledge among residents of malaria treatment. On a larger scale, this demonstrates the low level of education in the village and the lack of power over their health through the unquestioning acceptance of treatment provided by health officials.

The body of literature on malaria in South East Asia, and specifically Cambodia, is limited. There is some published literature on the topic, but the majority of it is inaccessible due to publication in smaller journals for which there are no electronic versions or the University of Toronto does not subscribe. Therefore, there is little information available for comparison of the results of this survey.

This study has some limitations. The data were cross-sectional in nature, which precludes causal inference. Longitudinal data would have allowed changes in health status to be tracked over time. The survey was

a self-reported questionnaire and as such is subject to reporting bias where individuals are more likely to report positive preventive practices. It is possible that respondents reported using bed nets more frequently than in reality. The question "Do you repair holes in your bed net?" was of limited value in the analysis because many respondents stated that they did repair bed nets, but the researchers were able to see the holes in the nets.

Although every attempt was obtained to a representative sample, it is possible that error was introduced at this stage of the study due to the layout of the village and the absence of a system of registering homesteads. Despite this, the fact that over 50% of the families in the villages were represented in the study is a strength.

Error may have also been introduced into the study in the translation process. It was noticed that in some questions, translators sometimes provided hints or led respondents to a certain response. The question "What is malaria?" was intended as an open-ended question, but it was often translated as "Is malaria a disease?" Also, some questions may not have been translated as written on the survey. For example, the question "What times of day have the greatest risk of getting malaria?" was translated on some occasions as "What times of day have the greatest risk of getting bit by a mosquito?".

It was thought that the inclusion of two other questions in the survey could have provided additional helpful information. The first question would have asked if respondents were tested for malaria before they received treatment. This would have been an important question in determining if private practitioners were correctly diagnosing and treating malaria. A question asking if respondents and families used bed nets more or less frequently during the wet and dry seasons would have also been useful.

In summary, it is felt that the results from this study have provided meaningful information to the local health department. This study has shed light on the limitations to current data collection methods. If health planning and education is to be improved in the future, better health data will be required to inform decisions.

### **Acknowledgements**

The authors would like to thank Chantha Gnim and Roth Chhim for translating the surveys. Without their assistance, this study would not have been possible.

## Appendix

**Table A1.** Describing the malaria burden (CK episodes) in Chom Kabey Village, Kep Municipality

	Adults with malaria			Men with malaria			Women with malaria		
Variable	n	%	95% CI	n	%	95% CI	n	%	95% CI
<b>Overall</b>	83	28.5	23.4 - 34.1	-	-	-	-	-	-
<b>Sex</b>									
Male	40	35.1	26.4 - 44.6	40	35.1	26.4 - 44.6	-	-	-
Female	43	24.3	18.2 - 31.3	-	-	-	43	24.3	18.2 - 31.3
<b>Age group</b>									
18-24	8	26.7	12.3 - 45.9	5	62.5	24.5 - 91.5	3	13.6	2.9 - 34.9
25-34	19	25.0	15.8 - 36.3	10	29.4	15.1 - 47.5	9	21.4	10.3 - 36.8
35-44	23	30.3	20.2 - 41.9	10	43.5	23.2 - 65.5	13	24.5	13.8 - 38.3
45-54	20	34.5	22.5 - 48.1	6	35.3	14.2 - 61.7	14	34.1	20.1 - 50.6
55-64	9	30.0	14.7 - 49.4	7	33.3	14.6 - 57.0	2	22.2	2.8 - 60.0
65+	4	19.0	5.4 - 41.9	2	18.2	2.3 - 51.8	2	20.0	2.5 - 55.6
<b>Length of residence</b>									
< 5 years	12	16.4	8.8 - 27.0	9	28.1	13.7 - 46.7	3	7.3	1.5 - 19.9
5-10 years	53	33.1	25.9 - 41.0	24	38.7	26.6 - 51.9	29	29.6	20.8 - 39.7
>10 years	18	31.0	19.5 - 44.5	7	35.0	15.4 - 59.2	11	28.9	15.4 - 45.9
<b>Education</b>									
No School	26	29.9	20.5 - 40.6	4	26.7	7.8 - 55.1	22	30.6	20.2 - 42.5
Primary school	41	31.3	23.5 - 40.0	22	40.0	27.0 - 54.1	19	25.0	15.8 - 36.3
Secondary school	16	22.9	13.7 - 34.4	14	34.1	20.1 - 50.6	2	6.9	0.8 - 22.8
> Secondary school	0	0.0	0.0 - 70.8	0	0.0	0.0 - 70.8	-	-	-
<b>Occupation</b>									
Farmer/plantation	61	26.0	20.5 - 32.1	34	35.1	25.6 - 45.4	27	19.6	13.3 - 27.2
Thatchmaker	10	50.0	27.2 - 72.8	-	-	-	10	50.0	27.2 - 72.8
Fisherman	0	0.0	0.0 - 97.5	-	-	-	0	0.0	0.0 - 97.5
Merchant	2	50.0	6.8 - 93.2	2	66.7	9.4 - 99.2	0	0.0	0.0 - 97.5
Other	10	32.3	16.7 - 51.4	4	28.6	8.4 - 58.1	6	35.3	14.2 - 61.7
<b>Marital status</b>									
Single	1	20.0	0.5 - 71.6	1	50.0	1.3 - 98.7	0	0.0	0.0 - 70.8
Married	73	28.7	23.3 - 34.7	33	22.8	16.2 - 30.5	40	36.7	27.7 - 46.5
Widowed	9	28.1	13.7 - 46.7	9	30.0	14.7 - 49.4	0	0.0	0.0 - 84.2

<b>Table A2. Describing the malaria burden (lifetime episodes) in Chom Kabey Village, Kep Municipality</b>									
	<b>Adults with malaria</b>			<b>Men with malaria</b>			<b>Women with malaria</b>		
Variable	n	%	95% CI	n	%	95% CI	n	%	95% CI
<b>Overall</b>	117	40.2		-	-	-	-	-	-
<b>Sex</b>									
Male	63	53.3	45.7 - 64.6	63	53.3	45.7 - 64.6	-	-	-
Female	54	30.5	23.8 - 37.9	-	-	-	54	30.5	23.8 - 37.9
<b>Age group</b>									
18-24	11	36.7	19.9 - 56.1	6	75.0	34.9 - 96.8	5	22.7	7.8 - 45.4
25-34	23	30.3	20.2 - 41.9	14	41.2	24.6 - 59.3	9	21.4	10.3 - 36.8
35-44	30	39.5	28.4 - 51.4	15	65.2	42.7 - 83.6	15	28.3	16.8 - 42.3
45-54	33	56.9	43.2 - 69.8	13	76.5	50.1 - 93.2	20	48.8	32.9 - 64.9
55-64	14	46.7	28.3 - 65.7	11	52.4	29.8 - 74.3	3	33.3	7.5 - 70.1
65+	6	28.6	11.3 - 52.2	4	36.4	10.9 - 69.2	2	20.0	2.5 - 55.6
<b>Length of residence</b>									
< 5 years	23	31.5	21.1 - 43.4	16	50.0	31.9 - 68.1	7	17.1	7.2 - 32.1
5-10 years	67	41.9	34.1 - 49.9	33	53.2	40.1 - 66.0	34	34.7	25.4 - 45.0
>10 years	27	46.6	33.3 - 60.1	14	70.0	45.7 - 88.1	13	34.2	19.6 - 51.4
<b>Education</b>									
No School	37	42.5	32.0 - 53.6	10	66.7	38.4 - 88.2	27	37.5	50.3 - 73.6
Primary school	52	39.7	31.3 - 48.6	31	56.4	42.3 - 69.7	21	27.6	18.0 - 39.1
Secondary school	27	38.6	27.2 - 51.0	21	51.2	35.1 - 67.1	6	20.7	8.0 - 39.7
> Secondary school	1	33.3	0.8 - 90.6	1	33.3	0.8 - 90.6	-	-	-
<b>Occupation</b>									
Farmer/plantation	91	38.7	32.5 - 45.3	54	55.7	45.2 - 65.8	37	26.8	19.6 - 35.0
Thatchmaker	10	50.0	27.2 - 72.8	-	-	-	10	50.0	27.2 - 72.8
Fisherman	0	0.0	0.0 - 97.5	-	-	-	0	0.0	0.0 - 97.5
Merchant	3	75.0	19.4 - 99.4	3	100.0	29.2 - 0.0	0	0.0	0.0 - 97.5
Other	13	41.9	24.5 - 60.9	6	42.9	17.7 - 71.1	7	41.2	18.4 - 67.1
<b>Marital status</b>									
Single	3	60.0	14.7 - 94.7	1	33.3	0.8 - 90.6	2	100.0	15.8 - 0.0
Married	102	40.2	34.1 - 46.5	61	56.0	46.1 - 65.5	41	28.3	21.1 - 36.3
Widowed	12	37.5	21.1 - 56.3	1	50.0	1.3 - 98.7	11	36.7	19.9 - 56.1

<b>Table A3. Odds ratios and 95% CI of respondents having malaria and individual-level questionnaire items</b>			
	<b>OR</b>	<b>CL</b>	<b>p-value</b>
<b>Knowledge Item</b>			
Word Malaria	0.7414	0.0665, 8.2712	0.6455
What is Malaria	2.7576	1.3475 – 5.6431	0.004
Symptoms (fever and chills)	4.8387	2.2739, 10.2963	<0.00001
Transmission (mosquito)	1.3513	0.6758, 2.7020	0.39
Risk	0.7872	0.4653, 1.3318	0.372
<b>Attitude Item</b>			
Serious – Adult	1.6531	0.6932, 3.9421	0.25
Serious – Child	0.9337	0.4741, 1.8388	0.84
Die	0.9187	0.2017, 4.1839	0.60
Worry	0.7477	0.2799, 1.9976	0.56
Problem in CK	1.0953	0.6719, 1.7856	0.71
Problem in Cambodia	0.6371	0.3780, 1.0736	0.09
<b>Prevention Item</b>			
Bed net	0.6566	0.2393, 1.8017	0.41
Dipped	0.5272	0.2586, 1.0749	0.07
<b>Malaria Education</b>			
Radio	1.1803	0.7368, 1.8908	0.49
VHV	0.6734	0.4161, 1.0898	0.10

<b>Table A4. Odds ratios and 95% CI for a case of household malaria and household-level questionnaire items</b>			
	<b>OR</b>	<b>CL</b>	<b>p-value</b>
Everyone in the household always sleep under bed net	0.8961	0.5506, 1.4586	0.65
Dipped	1.5154	0.7913, 2.9023	0.20
Radio	1.2418	0.7802, 1.9766	0.36
VHV	0.9414	0.5888, 1.5050	0.80



<b>Table A5. Logistic regression models for lifetime episodes of malaria among all respondents</b>				
Model		OR	CL	p-value
1	<i>Sex</i>	<u>2.8137</u>	<u>1.7263, 4.5862</u>	<u>&lt;0.0001</u>
2	<i>Age</i>	1.0143	0.9972 1.0317	0.1015
3	Education (ref: no school)			
	primary	0.8895	0.5129, 1.5426	0.6768
	secondary	0.8485	0.4465, 1.6126	0.6161
	post secondary	0.6757	0.0590, 7.7349	0.7526
4	Occupation (ref: farmer)			
	thatchmaker	1.5824	0.6338, 3.9508	0.3255
	fisherman	0.0000	0.0000, 1.0E12	0.9662
	merchant	4.7473	0.4864, 46.3354	0.1803
	other	1.1429	0.5344, 2.4441	0.7306
5	Marital Status (ref: single)			
	married	0.4474	0.0735, 2.7246	0.3829
	widowed	0.4000	0.0582, 2.7476	0.3514
6	<i>Length of Residence in CK</i>	<u>1.0530</u>	<u>1.0016, 1.1070</u>	<u>0.0432</u>
7	Household Size	1.0049	0.9057, 1.1149	0.9268

<b>Table A6. Logistic regression models for lifetime episodes of malaria among male respondents</b>				
Model		OR	CL	p-value
1	<i>Age</i>	0.9974	0.9737, 1.0217	0.8345
2	Education (ref: no school)			
	primary	0.6458	0.1948, 2.1410	0.4746
	secondary	0.5250	0.1526, 1.8067	0.3068
	post secondary	0.2500	0.0180, 3.4669	0.3015
3	Occupation (ref: farmer)			
	thatchmaker			
	fisherman			
	merchant	438872.2207	0.000 - >1E12	0.9601
	other	0.5972	0.1926, 1.8521	0.3720
4	Marital Status (ref: single)			
	married	2.5417	0.2238, 28.8717	0.4518
	widowed	2.0000	0.0511, 78.2486	0.7110
5	<i>Length of Residence in CK</i>	1.0184	0.9561, 1.0847	0.5720
6	Household Size	1.0558	0.8870, 1.2568	0.5412

Table A7. Logistic regression models for lifetime episodes of malaria among female respondents				
Model		OR	CL	p-value
1	Age	1.0249	0.9991, 1.0514	0.0590
2	Education (ref: no school)			
	primary	0.6364	0.3182, 1.2727	0.2012
	secondary	0.4348	0.1572, 1.2022	0.1085
	post secondary	-	-	-
3	Occupation (ref: farmer)			
	thatchmaker	-	-	-
	fisherman	-	-	-
	merchant	-	-	-
	other	-	-	-
4	Marital Status (ref: single)			
	married	0.0000	0.0000, >1.0E12	0.9697
	widowed	0.0000	0.0000, >1.0E12	0.9705
5	<i>Length of Residence in CK</i>	<i>1.1110</i>	<i>1.0275, 1.2012</i>	<i>0.0083</i>
6	Household Size	1.0122	0.8818, 1.1620	0.8629



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**Knowledge, Attitudes, Practices Survey for Kep Municipality**  
**January-March 2006**

Date: \_\_\_\_\_  
(DD/MM/YY)  
Interviewer: \_\_\_\_\_  
Translator: \_\_\_\_\_

**A. Personal Information**

**ID:** \_\_\_\_\_

1. Sex: M   F
2. Age: \_\_\_\_\_
3. How many years have you lived in Chom Kabey Village? \_\_\_\_\_
4. What is the highest level of education you have attained?
  - a. No school
  - b. Primary school
  - c. Secondary school
  - d. > Secondary school
5. What is your occupation?
  - a. farmer / plantation
  - b. thatchmaker
  - c. fisherman
  - d. merchant
  - e. other \_\_\_\_\_
6. What is your marital status?
  - a. Single
  - b. Married
  - c. Widowed
7. How many people live in your house? \_\_\_\_\_
8. How many of your children live with you in your house? \_\_\_\_\_

**B. Malaria Knowledge**

9. Have you ever heard the word malaria before?   Y   N
10. What is malaria?
  - a. a disease
  - b. don't know
  - c. other \_\_\_\_\_

11. What are the signs and symptoms you have when you are affected with malaria?

- a. fever
- b. chills
- c. sweating
- d. headache
- e. vomiting
- f. other \_\_\_\_\_

12. How is malaria transmitted?

- a. Mosquitoes
- b. Water
- c. Food
- d. Contact with a sick person
- e. Other \_\_\_\_\_

13. What times of day have the **greatest** risk of getting malaria

- a. from morning to night
- b. from night to morning
- c. any time of the day
- d. don't know

#### **Attitude Questions**

14. Do you think malaria is disease that is serious for adults?    Y    N    DK

15. Do you think malaria is disease that is serious for children?    Y    NDK

16. Do you think you can die from malaria?    Y    N    DK

17. Do you worry about getting malaria?    Y    N    DK

18. Do you think malaria is a problem in Chom Kabey Village?    Y    N    DK

19. Do you think malaria is a problem in Cambodia?    Y    N    DK

#### **C. Prevention Questions**

20. What do you do to protect yourself from malaria? (open ended)

- a. bed net
- b. boil/clean water
- c. clean food
- d. good living standards
- e. clear away brush
- f. destroy still water
- g. other \_\_\_\_\_

21. Do you have a bed net in your house?    Y    N

IF YES, skip to question 23.

IF NO, continue to question 21

22. Why do you not have a bed net? \_\_\_\_\_

23. How many bed nets do you have in your house? \_\_\_\_\_

24. How many bed nets do you use? \_\_\_\_\_

25. Do people in your household share a (sleep under the same) bed net? Y N

26. Do all the people in your house sleep under a bed net? Y N

IF YES, continue to question 27.

IF NO, skip to question 28.

27. How often does each person in your house use the bed net?

- a. Never
- b. Sometimes
- c. Always

Only answer questions 27-29 if answered NO to question 25.

28. Why doesn't everyone in your house sleep under a bed net? (open)

- a. Don't have enough/Too expensive
- b. Too hot
- c. Not available
- d. Don't worry about malaria
- e. Other\_\_\_\_\_

29. Who does sleep under a bed net in your house?

- a. Mother
- b. Father
- c. Children
- d. Other

30. Who does not sleep under a bed net in you house?

- a. Mother
  - b. Father
  - c. Children
  - d. Other
- 

31. Where did you get the bed net?

- a. Free – Red Cross
- b. Free – Political Party
- c. Free – Don't Know
- d. Bought it
- e. Other\_\_\_\_\_

32. How long have you had your oldest bed net? \_\_\_\_\_

33. How long have you had your newest bed net? \_\_\_\_\_

34. Have you ever dipped (impregnated) the bed net in liquid/chemicals? Y N

35. Are there holes in your bed net?      Y      N      DK

36. Do you repair the holes? Y   N      NA

**D. Health Seeking Behaviour**

37. Do you remember ever being sick from malaria?      Y      N

IF YES, continue to question 38.

IF NO, skip to question 45.

38. How many times have you been sick from malaria? \_\_\_\_\_

39. When were you sick with malaria/how many years ago? \_\_\_\_\_

40. When you had malaria where did you go to get treatment?

- a. Did not get treatment
- b. Health centre/hospital
- c. Private Practitioner
- d. Pharmacy
- e. Other\_\_\_\_\_

41. IF A, Why did you not get treatment?

- a. Treatment is too expensive
- b. Treatment not available
- c. Did not know where to go to get treatment
- d. Could not leave family
- e. Had to work
- f. Other\_\_\_\_\_

42. IF B or C, What kind of treatment did you get?

- a. Pills
- b. Injection / I.V.
- c. Nothing
- d. Herbal medicines
- e. Other\_\_\_\_\_

43. Did you finish your treatment?      Y      N

44. Has someone in your family ever been sick from malaria?      Y      N

45. When were they sick from malaria/How many years ago? \_\_\_\_\_

IF YES, continue to question 46.

IF NO, skip to question 52.

46. Who in your family has been sick from malaria?

- a. Husband/wife
- b. Children
- c. Parents

- d. Other\_\_\_\_\_
47. When someone in your family had malaria where did they go to get treatment?
- Did not get treatment
  - Health centre/hospital
  - Private Practitioner
  - Pharmacy
  - Other\_\_\_\_\_
48. Why did they not get treatment?
- Treatment is too expensive
  - Treatment not available
  - Did not know where to go to get treatment
  - Could not leave family
  - Had to work
  - Other\_\_\_\_\_
49. What kind of treatment did they get?
- Pills
  - Injection / I.V.
  - Herbal medicines
  - Nothing
  - Other\_\_\_\_\_
50. Did they finish their treatment?      Y      N      DK

### **E. Malaria Education**

51. Have you heard about malaria on the radio? Y      N
52. How often do you hear about malaria on the radio? \_\_\_\_\_
53. What did you hear about on the radio?
- bed nets
  - still water
  - clean house
  - medication
  - don't remember
  - don't pay attention
  - go to health centre if sick
  - boil/clean water
  - other
54. Have you ever been educated about malaria by a VHV in your village? Y      N
55. If NO, was it because you did not attend? Y      N
56. What did the VHV educate you about?
- bed nets
  - still water

- c. clean house
- d. medication
- e. don't remember
- f. don't pay attention
- g. go to health centre if sick
- h. boil/clean water
- i. other



UNIVERSITY OF TORONTO  
Graduate Department of Community Health  
Master of Health Science-Community Health and Epidemiology Specialization

**Student Assessment of Practicum**

Student's Name: \_\_\_\_\_ Suzanne Fournier Katherine Smith \_\_\_\_\_

Practicum Setting: \_\_\_\_\_ CIH Field Station, Kep, Cambodia \_\_\_\_\_

Supervisor: \_\_\_\_\_ David Zakus \_\_\_\_\_

For the following, place a check at the appropriate place on the scale.

1. The range of activities provided in the practicum setting was:

\_\_\_\_\_ x \_\_\_\_\_  
less than expected                      about what was expected                      much better than expected

Comments and suggestions:

The activities we participated in were as expected. We were able to prepare and administer a survey, analyze data, but also had the chance to participate in the community. We arranged a bed net dipping day where we distributed bed nets to villagers, and also dipped nets in insecticide.

2. List major types of activities undertaken:

1. Designed a KAP questionnaire on malaria
2. Informed the KAP survey through meetings with the malaria control doctor for the municipality of Kep to make the questionnaire relevant to the local setting
3. Conducted a household survey of malaria in the village of Chom Kabey with the assistance of translators fluent in English and Khmer
4. Analyzed survey results with Epi Info v3.3.2
5. Prepared a detailed report on malaria in rural Cambodia
6. Bought, distributed, and dipped bed nets

3. The amount of time available to pursue an area of special interest was:

\_\_\_\_\_ x \_\_\_\_\_  
less than you needed                      about right                      more than you needed

Comments and suggestions:

There is ample to do in the Kep area, and sufficient time to take a few hours a week to learn more about other health needs in the municipality.

4. Did you do a special project? \_\_\_\_\_ no \_\_\_\_\_

5. Did you make any presentations to staff of agency? \_\_\_\_\_ yes, to the local health department \_\_\_\_\_

6. Did you prepare a written report of the special project? \_\_\_\_\_ N/A \_\_\_\_\_

7. The availability of your supervisor for consultation was:

\_\_\_\_\_ x \_\_\_\_\_  
less than you wanted                      about right for you                      more than you had expected

Comments and suggestions:

Our supervisor was back in Canada while we were in Cambodia. This was not a problem in terms of preparation of the survey, but on occasion we had questions about data analysis, and an individual trained in epi/biostats would have been extremely useful. Ultimately, it did not prevent us from doing the project in the way we wanted, it just sometimes took us a bit longer to do things.

8. Overall, you would rate the Practicum I experience as:

Poor Fair Good Very Good Superior

x

Comments and suggestions:

The experience was great. It was a privilege to be there.

9. You would rate the learning that occurred during your practicum as:

Low Moderate High

x

Comments and suggestions:

Having the chance to conduct research in a country such as Cambodia was an invaluable experience. We learned how to perform research without the resources that would have been available in Canada. It taught us to be extremely resourceful, and how to look for simple solutions.

General comments about your experience:

This was an excellent learning experience in terms of gaining survey development skills and practical experience conducting a survey in a resource-scarce setting. We were involved at each stage of the research process: from defining the project, to writing and modifying the survey, conducting household interviews and data analysis.

General suggestions for improvement:

The CHE program should work more closely with the CIH to try and develop some ongoing public health projects for students to go on. There is a definite need for students with graduate level skills in data collection, interpretation and analysis. We felt that this experience would have been improved if there was on-site support from an epidemiologist. Another suggestion would have been a better explanation on arrival in Kep of how the field station operated. A simple 30 min orientation would have been sufficient. We struggled the first few weeks in understanding how it all worked.

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Signature

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Date

**Please return this form to:**

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February, 2006

